

GAO

Report to the Ranking Member  
Subcommittee on International Security,  
Proliferation, and Federal Services  
Committee on Governmental Affairs  
U. S. Senate

May 2000

# MISSILE DEFENSE

## Status of the National Missile Defense Program



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National Security and  
International Affairs Division

B-283281

May 31, 2000

The Honorable Daniel K. Akaka  
Ranking Member, Subcommittee on International Security,  
Proliferation, and Federal Services  
Committee on Governmental Affairs  
United States Senate

Dear Senator Akaka:

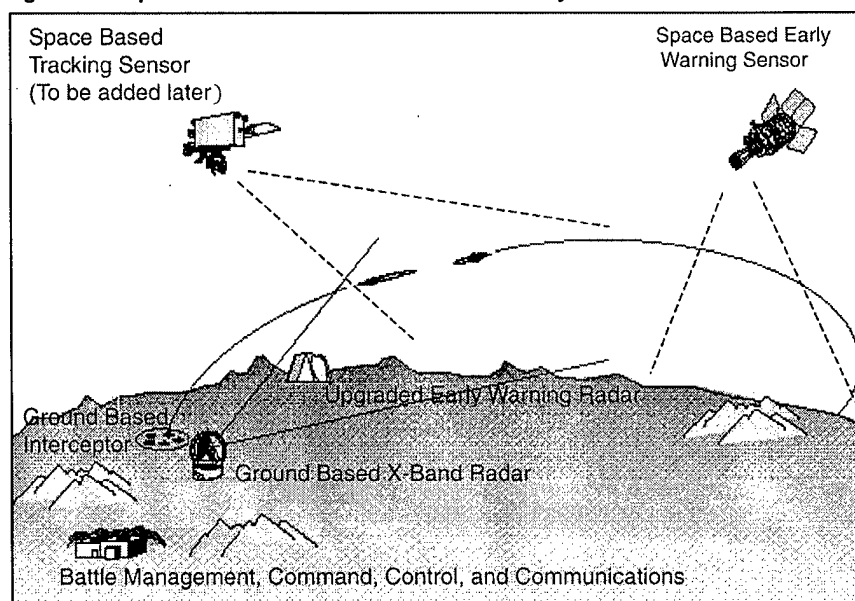
The Department of Defense is developing a National Missile Defense system to protect the United States against a ballistic missile attack with weapons of mass destruction from "rogue" nations such as North Korea and Iran. Following a departmental review by the end of July 2000, the administration plans to decide on whether to deploy the system. Factors in this decision are likely to include the severity of the threat, the maturity of the technology involved, and affordability. The deployment decision is among the most important defense issues facing the nation this year.<sup>1</sup>

The National Missile Defense system, when fully deployed, would include (1) space- and ground-based sensors to provide early warning of attacking missiles and to initially identify and track them; (2) ground-based radars to further identify and track the threatening warheads and assess whether the system destroyed the warheads; (3) ground-based interceptors, each consisting of a three-stage booster and payload (called a kill vehicle) capable of guiding itself to collide with and destroy incoming warheads (a concept called hit-to-kill) outside the atmosphere; and (4) a battle management, command, control, and communications system. (See fig. 1.)

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<sup>1</sup> The President's budget submission for fiscal year 2001 contains a \$1.9-billion request for the National Missile Defense system.

Figure 1: Representative National Missile Defense System



Source: Ballistic Missile Defense Organization.

Three levels of system capability are being planned. The Capability I system, which is approved for development by the Department of Defense, is designed to address a threat involving a few enemy missiles and simple countermeasures.<sup>2</sup> Capability II and III systems, which have not yet been approved for development, would evolve over time through the incorporation of additional interceptors at multiple defense sites, more sensors, and more advanced technologies to defend against more missiles with increasingly sophisticated countermeasures.

In June 1998, we reported on the program's funding requirements and schedule and technical risks. We found that even with increased funding for risk mitigation, technical and schedule risks were high.<sup>3</sup>

<sup>2</sup> Countermeasures refer to the enemy's use of devices and techniques intended to impair the National Missile Defense system's operational effectiveness.

<sup>3</sup> *National Missile Defense: Even With Increased Funding Technical and Schedule Risks Are High* (GAO/NSIAD-98-153, June 1998).

This report responds to your request for assistance in monitoring changes in the National Missile Defense program since our June 1998 report. Specifically, you asked us to (1) identify programmatic changes and determine whether significant performance and schedule risks remain and (2) identify program officials' efforts to control costs, the current program cost estimate, and the potential for cost increases. We also plan to report within the next month on the status of two other missile defense systems that are under development—the Navy Theater Wide and Patriot Advanced Capability-3 systems.<sup>4</sup>

## Results in Brief

To reduce risks, the Department of Defense has, since our June 1998 report, delayed initial fielding of the National Missile Defense system from fiscal year 2003 to 2005, delayed program decisions on the production of radars and interceptors, and increased funding for testing. Even with these programmatic changes, significant performance and schedule risks remain for several reasons.

- Developing a highly reliable hit-to-kill capability is a difficult technical challenge. In various missile defense programs, this capability has been demonstrated in about 30 percent of the attempted intercepts outside the atmosphere, and a panel of experts convened by the Department noted in 1998<sup>5</sup> that the difficulty of performing the hit-to-kill capability very reliably had been underestimated.
- Only 3 of the 19 planned intercept attempts are scheduled prior to the July 2000 deployment review. None of these attempts will expose the interceptor kill vehicle to the higher acceleration and vibration loads of the much faster, actual system booster.
- Because the program has a very aggressive schedule, it is vulnerable to delays. Compared to the 15 years currently estimated to develop and field another missile defense system called the Theater High Altitude Area Defense system, the schedule to develop and field the National Missile Defense system covers only 8 years. The Department of Defense told the Congress last October that the development and deployment

<sup>4</sup> The ship-based Navy Theater Wide system is designed to intercept enemy ballistic missiles while they are still above the Earth's atmosphere. The ground-based Patriot Advanced Capability-3 system is designed to intercept such missiles within the atmosphere.

<sup>5</sup> *Report of Panel on Reducing Risk in Ballistic Missile Defense Flight Test Programs*, Institute for Defense Analyses, February 27, 1998

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schedule was compressed by at least 4 years because of the seriousness of the emerging missile threat from rogue nations.

To control costs, the Department of Defense has implemented several measures, including a process called "cost as an independent variable," which sets realistic cost objectives and trades off the system's performance and schedule to control costs. Departmental officials estimate that the savings from this process include \$4.3 billion from early trade studies conducted by the prime contractor on alternative mixes of radars and interceptor locations. After incorporating the expected cost savings from these measures, the National Missile Defense program office estimated that the approved program would cost \$36.2 billion over the life of the Capability I system or about \$7.5 billion more than its 1999 estimate.<sup>6</sup> The cost increased mostly because of the decision to increase the number of interceptors and add flight tests, ground-test equipment, and a more capable radar facility. Estimated costs are likely to increase further because of the vulnerability to schedule delays. Using current spending rates the program office estimates that each month of delay would increase program costs by \$124 million. The Department has not prepared official cost estimates for the Capability II and III systems. However, a decision to expand the program by funding a Capability II or III system would increase program costs by billions of dollars because it would involve more interceptors and more and better ground- and space-based elements.

In commenting on a draft of this report, the Department of Defense concurred with the information presented. (Written comments are provided in appendix I.)

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## Despite Program Restructuring in 1999, Significant Performance and Schedule Risks Remain

To reduce program risks, the Department of Defense (DOD) restructured the National Missile Defense (NMD) program in 1999 by lengthening the time available for system development and adding independent reviews. However, performance and schedule risks remain significant because of the technical challenge, test limitations, and the ambitious schedule.

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<sup>6</sup> All costs in this report are in then-year (adjusted for expected inflation) dollars.

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## NMD Program Restructured

In April 1996, DOD changed the purpose of the NMD program from a "technology" readiness program intended to develop and mature technologies for possible use in a NMD system to a "deployment" readiness program. The deployment readiness program was designed to develop and demonstrate, by fiscal year 2000, an initial system with 20 interceptors that could be deployed by fiscal year 2003. In February 1998, a panel of high-level military and civilian experts issued its report on risks associated with ballistic missile defense flight-test programs. The expert panel reported that the strategy of accepting a high level of risk to shorten the deployment schedule is more likely to cause program slips, higher costs, and even program failure. It found that the NMD program would benefit from immediate restructuring to reduce program risks.

In January 1999, the Secretary of Defense restructured the NMD program. The Secretary established the objective of completing system development and fielding the 20 interceptors by the end of fiscal year 2005 (or about 2 years later than previously planned), if so directed by the President. In addition, the Secretary established a DOD-level review—called the deployment readiness review—to assess the system and to recommend to the President whether it should be deployed. This review has been rescheduled from June 2000 to July 2000. Assuming an affirmative decision to deploy, DOD plans to decide on production of the NMD site radar and upgrading existing early warning radars in the second quarter of 2001 and production of the interceptors and associated equipment in the first quarter of 2003. If the administration decides that the system does not warrant deployment following the readiness review, DOD plans to continue technology development.

Following the Secretary's actions, the expert panel was reconvened to assess the impact of the program's restructuring. In November 1999, the panel reported that while the restructuring reduced risk by providing more time for system development, program risks remain high.<sup>7</sup> To address these risks, it recommended expansion of the ground-testing capability and provision of additional kill vehicle components for testing and flight-test backups.

In the President's budget submission for fiscal year 2001, DOD has requested funding to address the expert panel's concerns. Specifically, it

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<sup>7</sup> *National Missile Defense Review*, Institute for Defense Analyses, November 1999.

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has requested funding for additional ground and flight testing following the deployment readiness review. In a separate action unrelated to the expert panel's report, DOD expanded the Capability I system to meet a larger threat by planning to deploy 80 additional interceptors by 2007.

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### Performance and Schedule Risks Are Significant

Even with DOD's risk reduction actions, the NMD program (1) remains a technically challenging program, (2) will undergo only a few of the planned flight tests before the deployment readiness review, (3) has increased performance risk because of flight-test restrictions, and (4) continues to have a very aggressive schedule.

### Hit-to-kill Capability Presents a Significant Technical Challenge

The challenge presented by the requirement for a highly reliable, very effective hit-to-kill capability is a difficult one. The NMD interceptor must hit an incoming target to destroy it. In addition, because the consequences of an attack can be so catastrophic, the NMD system is required to defend, with a very high probability of success, all 50 states against the threat of weapons of mass destruction carried aboard long-range ballistic missiles. Since 1983, various missile defense programs have attempted intercepts outside the atmosphere where the NMD system would be required to engage missiles. These missile defense programs have successfully demonstrated the hit-to-kill capability in 4 of 14 intercept attempts—about 30 percent. While the 4 successful intercepts provide support for the hit-to-kill concept, the 10 failed attempts raise questions about reliability. In its November 1999 report, the expert panel concluded that the NMD program office and contractor have continued to underestimate the challenge of reliably performing hit-to-kill intercepts.

### Only a Few of the Planned Flight Tests Are Scheduled Before the Deployment Readiness Review

As more testing is conducted, programmatic decisions tend to become less risky. At most, only 3 of the 19 planned intercept attempts will be completed prior to the July 2000 deployment readiness review. These three tests are described below.

- In October 1999, the first intercept attempt successfully hit the target. This flight test demonstrated the kill vehicle's ability to locate the target, perform guidance maneuvers, and collide with the target. The October test was not designed to rely on actual NMD system elements such as sensors and a battle management, command, and control system to guide the interceptor into relatively close proximity to the target before the kill vehicle located it. Instead, data from test range instruments and the target directed the kill vehicle until it was close enough for the kill vehicle to autonomously locate the target and collide with it.

- In January 2000, the second attempt did rely on actual ground- and space-based sensors and a battle management command and control system for interceptor guidance. Although these system elements reportedly worked well, this test failed to intercept its target because the kill vehicle device responsible for locating the target malfunctioned just seconds before the target intercept should have occurred.
- The third intercept attempt is scheduled for early July 2000. This will be the first intercept attempt with all system elements, except the actual booster, integrated. Since this test occurs less than 1 month prior to the July 2000 readiness review, DOD's Director, Operational Test and Evaluation, is concerned about the limited time available to fully assess test results. In a February 2000 memorandum to DOD's Under Secretary of Defense for Acquisition, Technology and Logistics, the director stated that previous NMD flight-test reports have taken from 10 to 18 weeks to complete. According to the NMD program office's Deputy Director, System Test and Evaluation, all that will be known by the deployment readiness review from the early July flight test is whether the intercept occurred and whether the system elements worked as expected. Little time will be available to analyze any causes for a less-than-expected level of system performance.

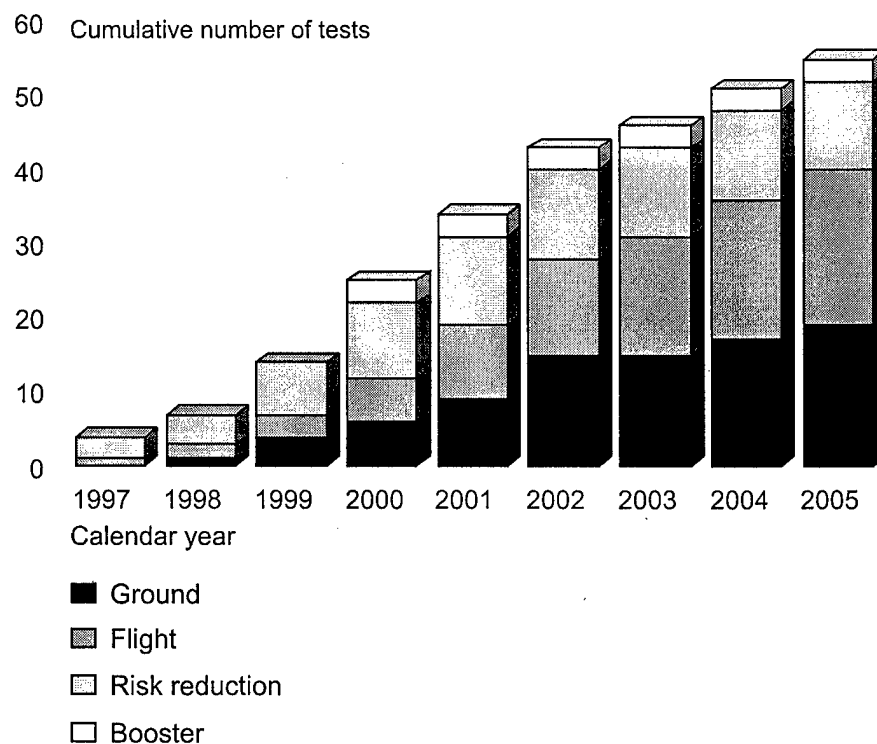
The two intercept attempts to date did not—and plans for the third intercept attempt do not—include the system's actual booster. Instead, the tests used or will use a substitute booster, called the payload launch vehicle, to carry the kill vehicle outside the atmosphere and into relatively close proximity to the target. The actual three-stage booster reaches a much greater velocity than the two-stage payload launch vehicle. Hence, the actual booster places much higher acceleration and vibration loads on the kill vehicle. In its November 1999 report, the expert panel viewed the kill vehicle's unproven ability to withstand loads from the actual system booster as a high risk to the program. According to the booster product manager, recent ground testing indicates that the kill vehicle can withstand the loads of the actual booster, but according to the manager, the analysis will not be complete until the kill vehicle is flown on the actual booster. However, the actual booster is not planned for use in an intercept attempt until early 2001.

The risk in deployment and production decisions tends to decrease as the amount of testing increases. More flight-test data will be available in the second quarter of 2001, when DOD plans to decide on producing sensors and upgrading radars, and considerably more data will be available in the first quarter of 2003, when it plans to decide on producing the interceptors.



Other types of test data will also increase over time. The test data are intended to increasingly demonstrate the system's ability to meet requirements and to validate the predictions of system performance based on the use of models and simulations. The type and numbers of primary tests completed over time are shown in figure 2.

**Figure 2: Cumulative Tests by Calendar Year**



Note: Ground tests consist of data processing hardware and software tested together to replicate the system. Risk reduction tests consist typically of reliability tests of offensive U.S. Air Force missiles, which are observed with NMD sensors. Booster tests are launches of the actual system boosters before their integration with other operating NMD elements. Beginning in 2001, all flight tests include the actual system booster.

Source: GAO, based on NMD program office data.

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Performance Risks Are Increased Because of Flight-test Restrictions and Uncertainties Regarding the Threat

A number of test limitations and uncertainties affect the program office's ability to test, analyze, and evaluate system performance.

- During testing, a target missile cannot be launched from a threat country such as North Korea and interceptors cannot fly from deployment sites yet to be constructed. Test targets are being launched westward from Vandenberg Air Force Base, California, while the ground-based interceptors are being launched eastward from the Kwajalein Missile Range in the Pacific Ocean. An actual enemy missile could approach the United States from several directions, depending on the attacking country. In its November 1999 report, the expert panel expressed concern over the limitations on test geometry.
- The early warning radar used during testing to track the target missile immediately after launch is located close to the launch point of the target missile. In an actual attack, the early warning radar would be alerted by space-based sensors, but would have to track an enemy missile flying toward the United States from thousands of miles away. A target missile launched near the early warning radar presents a large, easy target for the radar to detect.
- The flight path of an enemy missile, which could be launched from several locations, determines the intercept angle between the target and the interceptor. However, in flight testing, safety restrictions limit the flight path of both the interceptor and target missile to a predictable point over a narrow band of the Pacific Ocean.
- The NMD system could be required to engage more than one missile and fire more than one interceptor at each missile to destroy it. But the flight-test plans only include testing one interceptor against a single target missile. In his February 2000 Annual Report, the Director, Operational Test and Evaluation, identified this shortfall in flight testing as negatively impacting the NMD program's ability to evaluate system performance.
- The intercontinental ballistic missile threat posed by rogue nations is uncertain, which increases performance risk. The threat from Russia and China is better understood because both countries have deployed intercontinental ballistic missiles. North Korea tested a three-stage missile for the first time in August 1998, and according to the September 1999 national intelligence estimate, could test a more capable version at any time.<sup>8</sup> The 1999 estimate also shows that Iran could test an

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<sup>8</sup> *Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015*, National Intelligence Council, September 1999.

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intercontinental ballistic missile in the latter half of this decade. Similarly, the intelligence community is uncertain about what countermeasures a rogue nation would employ in attempting to defeat a missile defense system. In February 2000, DOD's Director, Operational Test and Evaluation, expressed concern regarding the lack of information on the real threat. He stated that the NMD test program risks building test targets not representative of enemy missiles or countermeasures.

To address the shortfalls in actual flight testing, the program office plans to use computer-based simulations. For example, the launch of enemy missiles and interceptors from other locations will be simulated, as will multiple interceptors engaging multiple targets. It is uncertain, however, whether the contractor's primary simulation tool, called LIDS,<sup>9</sup> will be fully available for predicting performance in time for the deployment readiness review in July 2000. The prime contractor noted this concern in February 2000, reporting a high risk of the LIDS tool not being available by the readiness review to support analysis of system effectiveness. If so, the contractor plans to use two other, older simulation tools. However, the agencies responsible for operational testing of the NMD system expressed concern that these older simulation tools produce overly optimistic results and would not accurately represent the system. In addition, according to the program office's October 1999 status report, the LIDS simulation tool is the only model that can represent the integrated NMD system.

The NMD system's June 1999 Test and Evaluation Master Plan, which was approved by test agencies responsible for NMD operational assessments, attempts to address the threat uncertainties, including countermeasures, in future rogue nation ballistic missile deployments. The test plan calls for the use of flight-test targets designed to exhibit a variety of individual characteristics relating to specific threats, including countermeasures. Also, the NMD program office is exploring alternatives for development and validation of future targets.

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<sup>9</sup> The NMD prime contractor is referred to as the lead system integrator and the simulation tool is called the Lead System Integrator Integrated Distributed Simulation, or LIDS.

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## NMD Acquisition Schedule Is Shorter Than Other Ballistic Missile Defense Acquisition Schedules

The NMD acquisition schedule requires completion of a large number and complex set of development and deployment activities in a relatively short amount of time. In restructuring the program in 1999, DOD added 2 years, allowing about 8 years for the development and deployment of the initial capability in 2005. However, the schedule is still much shorter than the schedules for most missile defense acquisitions. For example, the schedule is only about two-thirds as long as the Safeguard's—the only ballistic missile defense system that has been fielded in the United States.<sup>10</sup> The Theater High Altitude Area Defense system—currently under development—is projected to require 15 years before the system's initial fielding. While the Patriot Advanced Capability-3 system is only a modification to the existing Patriot air defense system, this acquisition is projected to take over 7 years from the beginning of engineering and manufacturing development to initial fielding.<sup>11</sup> In addition, technical problems are already eroding some of the additional time provided for NMD development. For example, the first attempt at intercepting a target was delayed about 4 months—from June to October 1999—because of multiple problems with the kill vehicle.

DOD acknowledges that even with the 2-year extension in the time available for development and deployment activities, the program's schedule is risky. In October 1999, the Under Secretary of Defense for Policy testified before the House Armed Services Committee that the "[NMD] program remains risky but we accept this risk." He stated that the development and deployment schedule was compressed by at least 4 years because of the seriousness of the emerging missile threat from rogue nations.

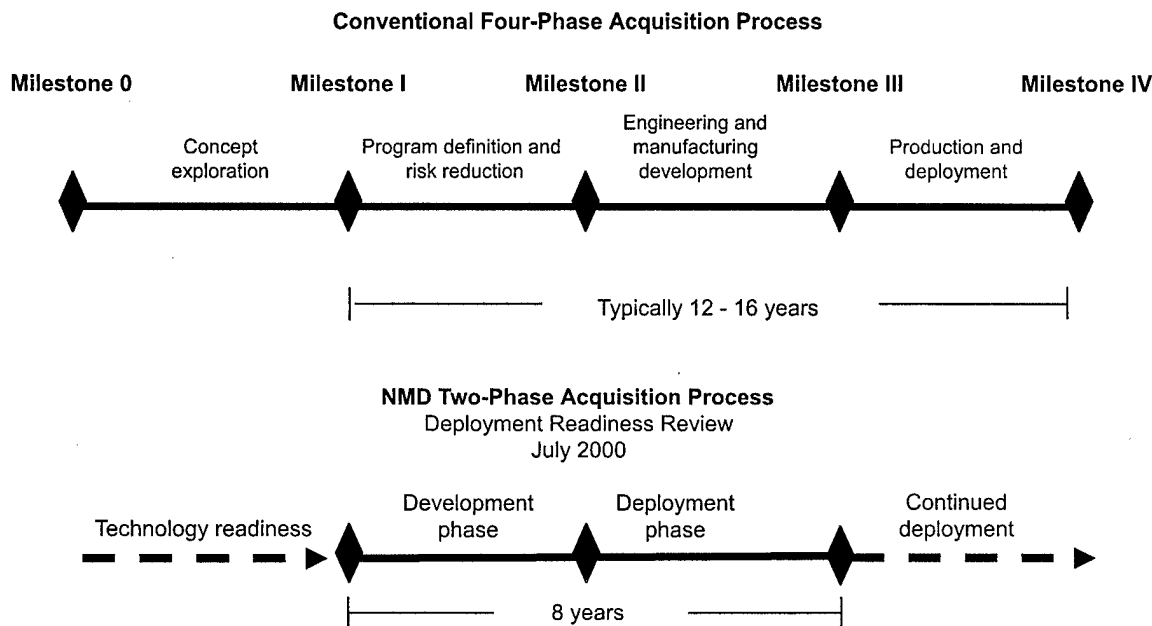
To accelerate the schedule, DOD abandoned the conventional four-phase acquisition process and implemented a tailored two-phase program structure. The conventional acquisition process is contrasted to the NMD program structure in figure 3.

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<sup>10</sup> Development of the Safeguard system components began in 1963 and the system's single site at Grand Forks, North Dakota, achieved full operational capability in 1975. The system was decommissioned in 1976.

<sup>11</sup> The Theater High Altitude Area Defense and Patriot Advanced Capability-3 systems are being developed to protect U.S. assets and forces deployed overseas and U.S. allies and friends from theater ballistic missile attacks. Theater ballistic missiles have shorter ranges than intercontinental ballistic missiles and are designed for use in major regional conflicts, such as Operation Desert Storm.

Figure 3: Conventional Acquisition Contrasted to NMD Program Structure



Source: GAO, based on NMD program office chart.

Flight tests scheduled over the next several months could be critical to the NMD schedule. The Under Secretary of Defense for Acquisition, Technology and Logistics, established criteria for the system's passing the deployment readiness review scheduled for July 2000. One criterion is having two successful intercepts—one of which relies on the actual elements of the integrated NMD system. One of two intercept attempts, to date, has been successful. The third attempt is scheduled for early July 2000. Based on the criteria, the award of a site construction contract can be made if one attempt was successful, but actual site construction—an event critical to the schedule—cannot begin until a second successful intercept. With the exception of the actual system booster, the third intercept attempt in July 2000 is expected to rely on elements of the integrated system.<sup>12</sup>

<sup>12</sup> The actual system booster is not scheduled for flight testing as part of the entire system until 2001. It is not included as an actual element of the system for purposes of the deployment readiness review intercept criteria.

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## Despite Cost Reduction Efforts, Restructuring Has Increased Costs and Further Increases Are Likely

As discussed below, DOD has implemented over the course of the program several measures directed at controlling NMD program costs.

- In April 1998, DOD awarded a 36-month, cost-plus-award-fee contract to Boeing North American to be the prime contractor, or lead system integrator. The prime contractor is accountable for completing development on each NMD element and integrating it into the overall system. The cost-plus-award-fee contract rewards superior performance in the following areas: system performance, schedule, cost, and program management. Award fee contracts provide the government with control over the contractor's fee—unlike fixed-fee type contracts—and, therefore, more direct influence over the contractor's efforts.
- The NMD program office established a "cost as an independent variable" process with its prime contractor. The process has the goal of setting realistic cost objectives and following through by making trade-offs between the system's performance and schedule to achieve a balanced set of goals. This process involves management of risks to achieve cost, performance, and schedule objectives; devising appropriate measures for tracking progress in achieving cost objectives; and providing incentives for the reduction of operating and support costs of the fielded system. In December 1999, the prime contractor reported that development and implementation of the "cost as an independent variable" process has been slow. However, according to the program office, notable savings have resulted from "cost as an independent variable" trade-off evaluations. For example, early trade-off studies conducted by the prime contractor on alternative mixes of radars and interceptor locations reduced estimated costs over the life of the program by about \$4.3 billion.
- The "family of radars" acquisition strategy is being used to reduce costs related to the NMD X-band radar. The strategy emphasizes commonality of hardware and software components to satisfy radar requirements for both theater and national missile defense. The strategy was used to procure the NMD prototype X-band radar. Advances in technology that were not available for the prototype radar are planned for the deployed radar. In every case, contractor-suggested changes in radar design to incorporate advances in technology stem from the Theater High Altitude Area Defense system. The NMD program office maintains that reuse of Theater High Altitude Area Defense hardware and software saved months of design and production time and \$80 million to \$100 million in engineering and production costs.

Since expanding the program in 2000, the program office estimates that the total NMD program cost is \$36.2 billion compared to the \$28.7 billion estimated in 1999 before the program expansion. The decision to field 100 rather than 20 interceptors accounts for almost \$2 billion of the cost increase. Other factors include the added costs for more flight tests, ground-test equipment, kill-vehicle hardware, and upgrades to the early-warning radar facilities. Table 1 shows the total program cost for the Capability I system by appropriation type, selected fiscal years, and cost to complete.

**Table 1: Total Cost of Capability I National Missile Defense System**

Dollars in millions

	Prior years	Fiscal year 2000	Fiscal year 2001	Fiscal year 2002	Fiscal year 2003	Fiscal year 2004	Fiscal year 2005	Cost to complete	Total
Research, development, test, and evaluation	\$4,717	\$950	\$1,740	\$850	\$792	\$689	\$681	\$1,543	\$11,962
Procurement	0	0	75	1,537	1,222	1,238	1,079	2,643	7,792
Military construction	10	15	102	192	127	38	15	0	498
Acquisition total	4,726	965	1,916	2,578	2,140	1,965	1,775	4,186	20,252
Operation and support	0	0	0	0	0	0	0	15,993	15,993
<b>Total</b>	<b>\$4,726</b>	<b>\$965</b>	<b>\$1,916</b>	<b>\$2,578</b>	<b>\$2,140</b>	<b>\$1,965</b>	<b>\$1,775</b>	<b>\$20,179</b>	<b>\$36,245</b>

Note: Costs are expressed in then-year dollars. Totals may not add due to rounding.

Source: Department of Defense.

Estimated costs are likely to increase further because the previously discussed risk factors could cause schedule delays. The costs of delay would depend on the reasons for and extent of the delay. However, using current spending rates, the program office estimates that each month of delay would increase NMD program costs by \$124 million.

A decision to enhance the program by evolving to the Capability II and III systems would substantially increase the overall cost of the program. For example, the Capability II or III systems would require from four to nine X-band radars. Excluding all research and development costs, DOD estimates that one X-band radar will cost \$1.2 billion over the life of the Capability I system. In addition, Capability III calls for at least

250 interceptors at multiple sites. DOD's cost estimate to produce, operate, and maintain 100 interceptors at a single site for the Capability I system is \$3.9 billion. Table 2 shows differences in the three levels of NMD capability designed to counter larger and more sophisticated threats.

**Table 2: Approved and Planned Levels of NMD Capability**

	Capability I (approved)	Capability II (planned)	Capability III (planned)
<b>Threat</b>	A few missiles and simple countermeasures	Tens of missiles and sophisticated countermeasures	More missiles and more sophisticated countermeasures
<b>Fielding</b>	2005 through 2007	Undecided	Undecided
<b>Site elements</b>			
Interceptors	100 (single site)	100 (single site)	250 plus (multiple sites)
Ground-based X-band radars	1 (single site)	4 (1 each, at 4 sites)	9 (1 each, at 9 sites)
Ground-based early warning radars	5 (1 each, at 5 sites)	5 (1 each, at 5 sites)	6 (1 each, at 6 sites)
Space-based sensors	Defense Support Program Satellites/Space-Based Infrared System-High Earth Orbit	Spaced-Based Infrared System-High/Low Earth Orbit	Space-Based Infrared System-High/Low Earth Orbit
Battle management, command, control, & communication	To link the elements with existing sensors	To link the elements with existing sensors	To link the elements with existing sensors
<b>Cost</b>	\$36.2 billion	Not released by DOD	Not released by DOD

Source: GAO, based on NMD program office data.

In April 2000, the Congressional Budget Office (CBO) reported DOD's cost estimate for a Capability I system, given certain CBO adjustments, as \$25.6 billion.<sup>13</sup> Among the adjustments, CBO assumed a deployment period ending in 2015 rather than at the end of the NMD system's projected deployment in 2026. Therefore, its estimate did not include procurement costs of \$0.91 billion and operation and support costs of \$8.99 billion for fiscal years 2016 through 2026. CBO also excluded \$0.70 billion in prior-year costs. Accordingly, CBO cited a DOD estimate that is significantly less than the \$36.2 billion estimate used in this report.

<sup>13</sup> The CBO also provided its independent estimates for Capability I, II, and III systems. See *Budgetary and Technical Implications of the Administration's Plan for National Missile Defense*, Congressional Budget Office, April 2000.



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## Agency Comments

In commenting on a draft of this report, DOD concurred with our findings. It also suggested technical changes, which we incorporated as appropriate. DOD's comments are reprinted in appendix I.

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## Scope and Methodology

To identify changes in the program since our June 1998 report and determine whether significant performance and schedule risks remain, we interviewed program officials and other relevant sources within and outside DOD, including a representative from the Office of the Director, Operational Test and Evaluation. We obtained and analyzed documentation such as system requirements documents, intelligence summaries of the threat, test plans and results, and the results of program reviews conducted by outside agencies. To determine what program officials are doing to control cost risks, what the program currently costs, and whether cost increases are likely, we interviewed program cost officials and contractor representatives from Boeing North American. We also discussed the program cost estimate with other knowledgeable officials within DOD. We obtained and analyzed copies of budget documents such as budget decisions, the contract, contractor voucher costs, and an independent cost estimate. During the course of our review, we visited the Ballistic Missile Defense Office in Washington, D.C.; the National Missile Defense Joint Program Office in Arlington, Virginia; the U. S. Army National Missile Defense Ground Based Elements Office in Huntsville, Alabama; the National Air Intelligence Center at Wright-Patterson Air Force Base, Ohio; the Central Intelligence Agency, Langley, Virginia; the Defense Intelligence Agency, Washington, D.C.; the Space and Missile Defense Command in Huntsville, Alabama; the Naval Surface Warfare Center in Dahlgren, Virginia; the Office of Science and Technology Policy in Washington, D.C.; the U.S. Army Test and Evaluation Command in Arlington, Virginia; the Cost Analysis Improvement Group, Strategic Systems in Washington, D.C.; the Institute for Defense Analyses in Alexandria, Virginia; and the Office of the Assistant Secretary of Defense (Acquisition, Technology, and Logistics), Strategic and Tactical Systems in Washington, D.C.

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We did not assess the impact of the Anti-Ballistic Missile Treaty on the NMD program.<sup>14</sup>

We conducted our work from June 1999 through May 2000 in accordance with generally accepted government auditing standards.

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As arranged with your staff, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from its issue date. At that time, we plan to provide copies of this report to the Honorable William Cohen, Secretary of Defense; the Honorable Lewis Caldera, Secretary of the Army; the Honorable Jacob Lew, Director, Office of Management and Budget; and key committees of the Congress. We will make copies available to others upon request.

If you or your staff have questions concerning this report, please contact me at (202) 512-4841. The major contributors to this report were Bob Levin, Stan Lipscomb, and Dayna Foster.

Sincerely yours,



Allen Li  
Associate Director  
Defense Acquisitions Issues

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<sup>14</sup> The Anti-Ballistic Missile Treaty between the United States and the former Soviet Union governs the conditions under which anti-ballistic missile systems and components can be developed and deployed. The Treaty as currently formulated would limit deployment to a single site near Grand Forks, North Dakota. The Secretary of Defense has directed that NMD development comply with the terms of the treaty, but according to the Secretary's current annual report to the President and the Congress, actual deployment would require modifications to the treaty.

# Comments From the Secretary of Defense



ACQUISITION AND  
TECHNOLOGY

## OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON  
WASHINGTON DC 20301-3000

12 MAY 2000

Mr. Allen Li  
Associate Director, Defense Acquisition Issues  
National Security and International  
Affairs Division  
U.S. General Accounting Office  
Washington, D.C. 20548

Dear Mr. Li:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "MISSILE DEFENSE: Status of the National Missile Defense Program," dated April 12, 2000 (GAO Code 707437/OSD Case 1983).

The DoD concurs with the draft report. Suggested technical changes for clarification and accuracy have been provided separately.

The Department appreciates the opportunity to comment on the draft report

Sincerely,

A handwritten signature in cursive script, reading "George R. Schneider".

George R. Schneider  
Director  
Strategic and Tactical Systems



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